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American Journal of Phytomedicine and Clinical Therapeutics ISSN 2321-2748 **2021** Vol.9 No.1:4

# Homoeopathy in the Treatment of Diabetes: A Review

# Abstract

Diabetes is one of the most fearsome concerns of the modern world. As the man has evolved he has tried to ease his life with inventions and technologies. These have led to unfit lifestyle changes and have caused a havoc on his health. The unhealthy lifestyle has resulted in various diseases one of which is diabetes. Diabetes is the inability of the body to process glucose leading to an increased level of glucose in the blood while the cells are deprived of it. A lot of work has been done and is still under process to curb the prevalence of this disorder. Homoeopathy is one such area of medicine that has had some success in the treatment of diabetes. Homoeopathy uses natural materials such as plants, animals, minerals to prepare medicines from. Plants form a major portion of homoeopathic medicines. Plants such as Syzygium jambolanum, Gymnema sylvestre, etc. have long been used to treat diabetes traditionally as well as in homoeopathy. These plants act in reducing the blood glucose level. It is therefore important that we focus more and more research on such easily and naturally available materials. It will not only reduce the load on pharma companies but will also make health care available to more and more people.

Keywords: Diabetes; Syzygium jambolanum; Gymnema sylvestre; Glucose

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**Citation:** Monika S, Shilpi S, Digvijay V (2021) Homoeopathy in the Treatment of Diabetes: A Review. Am J Phytomed Clin Ther Vol.9 No.1:4

Received: December 03, 2020; Accepted: January 20, 2021; Published: January 27, 2021

## Introduction

Diabetes is a group of heterogeneous disorders with the common elements of hyperglycemia and glucose intolerance. This mainly occurs due to insulin deficiency or inability of insulin to act or usually both [1]. Diabetes mellitus is more commonly referred to as Diabetes. On the basis of its nature of action diabetes is divided into three major types:

- 1. Type 1 diabetes
- 2. Type 2 diabetes
- 3. Gestational diabetes (Diabetes Atlas, second edition).
  - Type 1 diabetes is caused due to destruction of the islet beta cells of the pancreas. The cells fail to produce insulin as a result of autoimmune response.
  - Type 2 diabetes occurs due to the impairment of the body cells to absorb insulin.

of pregnancy but it may or may not continue to be present lifelong (Diabetes Atlas, second edition).

## **Literature Review**

Diabetes has become a serious cause of concern in the modern world. It has had a potent effect worldwide and has affected people of all age groups. Another reason why it is such a troublesome factor is the fact that it is a gateway to multiple diseases such as Coronary Artery Disease (CAD), cataract, blood pressure to name a few. People suffering from diabetes often fall prey to tons of other diseases.

Homoeopathy is a system of Complementary Alternative Medicine (CAM) that was first put into use by Samuel Hahnemann. For the better good of the mankind he introduced this system of medicine and it has served it's purpose though partially accepted. Homoeopathy has long been in use for the treatment of diabetes. With its wide range of medicines to treat diabetes it can play an important part in the treatment.

· Gestational diabetes is characterized during or onset

Plants serve as a raw material or drug for approximately 80

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percent of the medicines used in homoeopathy. There are many plants available that provide various alkaloids and phytochemicals that act as a potent inhibitor of glucose. However, in this review we have tried to concentrate our gaze on two of the most popular plants that are used in the homoeopathic treatment of diabetes (K. M. Nadkarni; Indian Materia Medica; vol. II). These are: *Syzygium jambolanum, Gymnema sylvestre, Cephalandra indica, Calendula officials* [2]. *Momordica charantia. Tinospora cordifolia, Terminalia chebula, Papaver somniferum, Curcuma longa, Phyllanthus emblica.* 

### Syzygium jambolanum

Scientific name: Syzygium jambolanum (Lam.) DC (theplantlist.org).

It is commonly called as jamun or jambol fruit. The plant is commonly distributed in India, Pakistan, Brazil and in parts of southern Asia (plant.jstor.org). It is one of the most quintessential medicines to treat diabetes in homoeopathy. As per the homoeopathic Materia Medica it has an immediate response to increased blood sugar [2].

**Description:** The plant is an evergreen tree ranging upto a height of 25 m.;outer bark pale yellow to brown in colour and flaky in nature; leaves shiny and glabrous; oblong to elliptic; tip rounded, inflorescence cymose; flowers pale orange to brown, sepals orange to brown, obconic, 4-5 mm × 3-4 mm, truncate; petals white, elliptic, 4 mm × 3 mm; stamens white, 4-6 mm long, filaments slender, style 5-6 mm long; fruits dark purple to red, ellipsoid, oblong and subglobose, curved, 2.4 - 3.5 cm × 2 cm long (plant.jstor.org).

#### Gymnema sylvestre

**Scientific name:** *Gymnema sylvestre* (Retz.) Schull. (Plant resources of Tropical Africa).

It is commonly known as miracle plant and gudmar. It is largely distributed in India, Middle East, Philippines, Malaysia, southern China, Vietnam and Australia (Plant resources of Tropical Africa, ENVIS Centre on Medicinal Plants).

Leaves are known to inhibit the effect of sweetness. Roots and leaves of the plant are also known to be purgative. It is commonly used to treat diabetes due to the inhibitory effect on sugar. The pharmacological properties are attributed to a group of triterpene saponins (TS), known as gymnemic acids (GA). Leaves contain 4 – 10% saponins including GA I – XVIII and gymnemosaponins I – V. Some researchers are of the view that just GA V – VII possess antidiabetic activity. supress the sensation of sweetness. All of them containing glucuronic acid and aglycon gymnemogenin esterified at the 21- and 28-positions [3].

**Description:** It is a perennial woody climber; growing upto 3 m in height; stem 15 mm in diameter rooting at nodes; bark grayish, lenticles; leaves opposite, simple and entire, apex rounded to acuminate, adaxial surface glabrous, hairy abaxial surface; inflorescence umbel like cyme; flowers bisexual, pentamerous, yellow; sepal ovate, obtuse apex, hairy; petal campanulate, hairy; fruit a pair of follicles, lancelate, pale green to brownish; seeds ovoid, flattened a coma of white hairs at apex [4,5].

## Cephalandra indica

#### Scientific name: Cephalandra indica (Wight & Ann.)

Synonym: Coccinia grandis (L.) Voigt. (theplantlist.org).

Commonly known as Lvy Gourd, Little Gourd Kovai. The plant is widely distributed in India, Indonesia, China, Malaysia, Philippines, Eastern Papua, Guinea, Vietnam [6].Polyherbal extract of the leaves is used as antidiabetic. Coccinia indica is famous plant for its safe antidiabetic property. Terpenoids found in this plant are responsible for antidiabetic activity. The leaves lower blood glucose by decreasing glucose synthesis through gluconeogenic enzymes glucose-6-phosphatase and fructose-1,6- biphosphatase by upregulating glucose oxidation via shunt pathway through activation of enzymes G6PDH [7].

**Description:** The plant belongs to the family Cucurbitaceae; a dioecious perennial herb growing upto 20 - 30 cm in length, climber having tendrils; root tuberous; stem green when young turning white at maturity, woody; leaves alternate, simple, petiolate, petiole 1 - 5 cm long, blade broad, ovate - pentagonal,  $3 - 12 \times 3 - 15$  cm, palmately lobed, lobes 3 - 5, base cordate, margin entire, toothed, glabrous; flowers axillary, unisexual, pentamerous, receptacle tubular, 3 - 7 mm long, sepals 5, linear, 6 mm long, petals 5, campanulate, lobed, 2 cm  $\times 1.5$  cm, yellow orange, male flowers solitary or paired, raceme, stamens 3, joined in a funnel, female flowers solitary, pedicillate, 2.5 cm long, style 3 mm long, stigma 3 lobed; fruit a berry, ellipsoid,  $3 - 7 \times 1 - 3.5$ cm, fleshy, green when young; seeds asymmetrical, pear shaped, compressed, grooved. (usesplantnet-project.org).

## Calendula officials

Scientific name: Calendula officials (L.).

Commonly known by the name such as Marigold, genda. It is well distributed in India, China, South Europe (indiabiodiversity.org). It has possess antioxidant, anti-inflammatory, antidiabetic, anti-pyretic, cytotoxic as well as tumor reducing the potential. The plant is plentiful in many pharmaceutical active ingredients such as auroxanthin, carotenoids, flavonoids, flavoxanthin, glycosides, triterpenoid esters, sterols, and steroids [8].

**Description:** The plant belongs to the family Asteraceae; an annual herb; growing upto 30 – 60 cm, taproot, stem, erect, angular, variously branched; leaves alternate, sessile, spathulate or oblancelate, margins toothed, glaucous; flower heads single borne on receptacle, epicalyx lanceolate; floerts tubular, orange to yellow, disc florets pseudo hermaphrodite but female sterile, zygomorphic ray florets toward the edge; stamens absent; ovary inferior; fruit achene, sickle shaped, curved and ridged [9].

## Momordica charantia

#### Scientific name: Momordica charantia.

Commonly called as bitter gourd, karela. The plant is plentiful in distribution in India, China, Nepal, Sri Lanka, Pakistan, Vietnam, Cambodia, Thailand, Indonesia (publishplantnet-project.org).

It is used in the treatment of various diseases including diabetes mellitus. In addition to its major use as an antidiabetic agent it is

also used as a tonic, emetic and laxative. Hypoglycaemic agents include charantin, vicine, polypeptide-p or p-insulin and kakra compounds (three non-steroidal hypoglycaemic compounds isolated from the fruit are the major compounds that have been isolated and identified from this plant [10].

**Description:** The plant is an annual to perennial climber belonging to the family Cucurbitaceae; reaching upto 2 - 3 m in height; taproot system of rooting; stem branched, slender, 5 angled, bearing tendrils; leaves single, dark green, palmately lobed, sharply toothed margins,rounded, 4 - 10 cm long, deeply lobed, lobes 5, stalked, 3 - 5 cm long stalk, spiral tendrils at opposite sides, pubescent, petiole 4 - 5 cm long; flowers pentamerous; sepals 5, green; petals 5, oval, yellow, 10 - 20 cm long; stamens 5, central; fruit berry, pendulous, 2 - 10 cm long, ridged, warty, orange to yellow at maturity, split when ripe; seeds pitted, 5 - 9 mm long [11].

## Tinospora cordifolia

**Scientific name:** *Tinospora cordifolia* (Willd.) Hook.f. and Thomas [12]. Commonly known as Mooncreeper, Heart-leaved moonseed, giloy. Widely distributed at higher altitude in places such as Bangladesh, Myanmar, Pakistan, Sri Lanka. In India it occurs in Andhra Pradesh, Assam, Bihar, Madhya Pradesh, Maharastra, Odisha, Himayalan Foothills (indiabiodiversity.org).

The plant is of high importance in the treatment of diabetes due to the presence of various classes of alkaloids, glycosides, steroids, etc. Anti-diabetic property of *T. cordifolia* is well established in traditional medicine and is also supported by the scientific community. Broad range of biological activity of *T. cordifolia* is often attributed to the existence of alkaloids. Berberine is a well proven anti-diabetic alkaloid in both pre-clinical and clinical studies [13,14].

Description: The plant belongs to the family Menispermaceae; gravish brown, corky bark, glabrous young shoots, striate stem, lenticels scattered, branches striate, aerial roots; leaves simple, alternate, broadly ovate, cordate or suborbicular, 4-17 × 4.5-14 cm broad, base cordate to sinuate, margin entire, apex deeply acuminate or cuspidate, membranous, thin, green, glabrous above, paler glabrous with glandular papillose patches beneath, petiole twisted, swollen near the base, pulvinate, glabrous, 2-7 cm long; inflorescence axillary, slender, pseudo-racemose cymes, 4-15 cm long; flowers unisexual, fascicled, yellow, pedicellate; male flowers, pedicels slender, glabrous about 3-4 mm long, sepals 6, in 2 series, inner series larger, elliptic, concave, 3-4 mm long, outer series smaller, 1-1.5 mm long, free, imbricate, subelliptic, apex acute, petals 6, free, rhomboidal, obovate, lateral edges inrolled, fleshy, stamens 6, free, filaments clavate, about 3 mm long, anthers loculed, subextrorse, obliquely or longitudinally dehisced; female flowers, sepals and petals similar as in male flowers, staminodes 6, carpels 3, curved-ellipsoid, about 2 mm long, glabrous, style short, stigma capitate; fruit a drupe, ovoid or globose, glabrous, shining, bright red when ripe, 5-7 mm across, stalks 4-7 mm long, pericarp thin, style scar subterminal, endocarp bony, very thin, subrotund or broadly elliptic 6-7 mm long, rounded, flattened ventral, slightly papillose on surface, style scars subbasal; seeds curved or half-moon shape, endospermic, cotyledons flattened, leaflike, radicle short (Indiabiodiversity.org).

## Terminalia chebula

Scientific name: Terminalia chebula Retz.

Commonly known as haritaki Chebulic myrobalan, Gallnut, Chebulic Myrobalam, chebulic Myrombalam. Distributed in Bangladesh, Myanmar, Sri Lanka. In India it is commonly found in Andhra Pradesh, Bihar, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Mahrastra, Odisha, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal (indiabiodiversity.org).

Due to its variuos pharmacological properties and alkaloids the plant is of high importance in the treatment of diabetes. Lipid peroxide formation and hydroxyl and superoxide radical scavenging is known to be inhibited from the methanolic extracts derived from the plant. Thereby, acting as anti-diabetic [13,14].

Description: The plant belongs to the family Combretaceae; a deciduous tree, upto 25 m high, thick bark, dark brown to black, shallow fissures; young shoots yellowish-brown, densely pubescent; greyish, glabrous branches; leaves simple, opposite to alternate, exstipulate; petiole 12-25 mm long, stout, grooved above, pubescent, 2 sessile glands at the top; lamina 9.5-28 × 4-13 cm, ovate, elliptic, obovate or elliptic-obovate, base round, obtuse, oblique or subtruncate, apex acute, acuminate, obtuse or apiculate, margin entire, glabrous, coriaceous; inflorescence terminal and axillary spike; flowers bisexual, greenish-white, 5-6 mm wide, pungent smell; bracts 2-3 mm long; calyx tube  $1.5-2.5 \times 0.8-1$  mm, villous, constricted above the ovary, lobes 5, creamy, triangular, 1.5 mm; petals 0; stamens 10 in 2 rows; filaments 4-6 mm; disc 5-lobed, villous; ovary 2 mm long, inferior, densely villous, 1-celled; style 5 mm, subulate; stigma terminal. Fruit a drupe 3-4 × 2-2.5 cm, obovoid, woody, obscurely 5 angled, glabrous, greenish-yellow; seed one (indiabiodiversity.org).

## Papaver somniferum

Scientific name: Papaver somniferum L.

Commonly known as Opium poppy. Distributed in Asia: Bhutan, China, India, Nepal, Pakistan; Africa: Algeria, Libya, Morocco, Tunisia; Europe: France, Greece, Italy, Portugal, Spain; North America. Arunachal Pradesh, Assam, Bihar, Delhi, Daman & Diu, Goa, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal (indiabiodiversity.org).

The plant is of high value in the treatment of diabetes. Antidiabetic plants traditionally considered as efficacious in treatment of diabetes-associated complications [15].

**Description:** The plant belongs to the family Solanaceae; an annual herbs, glaucous, glabrous rarely sparsely setose, measuring 50-100 cm tall; stem simple or branched; root stock, erect, slender, conical; leaves alternate, broadly lanceolate, ovate oblong, shallowly pinnatifid  $5-25 \times 2-7$  cm wide, base obtuse or rounded, margin serrate-dentate, apex obtuse to acute, glaucous, glabrous both above and beneath, petiole glabrous

1-2 cm long, upper cauline leaves, smallers and becoming more shallowly lobed, subsessile towards the shoot, base cordateamplexicaul; peduncles glabrous or sparsely bristly, 5-25 cm long; flowers bisexual, solitary, terminal, about 3-10 cm across, white, pale pink, pale purple, sometimes with black blotch at the base, flower buds oblong-ovoid, apex obtuse, 1.5-3 × 1-2 cm across, Sepals 2, free, deciduous, ovate-orbicular, early caducous, glabrous, petals 4, obovate, overlapping, apex rounded wavy, white, pale pink, pale purple, sometimes with black blotch at the base, about  $3-6 \times 3-8$  cm across; stamens numerous, usually as long as the ovary, filaments filiform, slender, yellowish, about 5-10 mm long, anthers oblong-elliptic, 1-1.5 mm long; ovary ovoid-globose, unilocular, superior, glabrous, about 10 mm long, ovules numerous, stigmatic rays disc yellow, enlarged, opposite to placentas, rays 7-18; fruits capsules, globular-ovoid, base rounded, apex flat topped, glabrous, 2-7 × 5-6 cm across, dehiscing by subapical pores or persistent disc; seeds many, globose, reniform, pale grayish white, black or grayish brown, about 0.3 mm wide, rich in oil (indiabiodiversity.org).

## Curcuma longa

#### Scientific name: Curcuma longa L.

Commonly called as haldi and turmeric. Distributed in tropical countries such as India, China, Sri Lanka (indiabiodiversity.org).

The plant contains various alkaloids that have been proven to show a number of effects but, the one of utmost importance here is its ability to treat diabetes. It may have an effect on insulin secretion. Curcuminoids, the active principles of the plant lower lipid peroxidation by upregulating enzymes such as superoxidedismutase, catalase and glutathione peroxidase. Isopropanol and acetone extract of the plant produce maximal inhibition of the enzyme Human Pancreatic Amylase (HPA) leading to reduction in starch hydrolysis resulting in decreased levels of glucose (powo.science.kew.org, [16].

Description: The plant belongs to the family Zingeberaceae; a rhizomatous herb; rhizome medium sized, 2-3 × 2-3 cm, conical, deep orange-yellow inside, strongly aromatic; sessile tubers many, cylindrical, branched; root tubers rare; shoot leafy, 80-120 cm tall, pseudostem c. 30 cm long; leaves 4-6, distichous; petiole 35-40 cm long; lamina 45-60 × 15-20 cm, oblong-lanceolate, tapering at both ends, margins wavy, glabrous, pubescent towards the extreme tip; ligule short, near the lamina; inflorescence central, 25-30 cm; peduncle 15 cm, concealed within the leaf sheaths; spike 8-10 cm long with a distinct white coma; coma bracts 8-10, 7 × 3.5 cm, spreading; fertile bracts 25-30, 4.5-5.5 × 3-4-5 cm, compactly arranged, lower half of adjacent bracts fused to form pouches, tip recurved, pale green, outer surface minutely pubescent, inner surface glabrous; lower bracts subtend cincinni of two flowers, upper bracts one flowered; flowers 4.5-5.5 cm long, equal to the bracts; bracteoles large, outer 3 × 2 cm, ovateoblong, inner 1.5 × 1 cm; sepal truncate, 1 cm long, minutely 3-lobed at the tip, white, outer surface minutely pubescent; Corolla tube 2.5 cm long, white, glabrous; lobes unequal; dorsal lobe larger, 1.5 × 1.7 cm, concave, white, hooded, hood hairy, lateral lobes linear, 1.5 × 1.2 cm, white, glabrous; labellum c. 2.2 × 2.5 cm, trilobed, middle lobe emarginate, light yellow with a broad, median dark yellow band; lateral staminodes linear, 1.5 × 0.8 cm, tip slightly incurved; anther-thecae 4 mm long, spurred; spurs 3 mm long, parallel; epigynous glands two, 5 mm long; ovary 5 mm long, tricarpellary, syncarpous; ovules many on axile palcenta, pubescent towards the tip; style long, filiform; stigma blipped (indiabiodiversity.org).

## **Phyllanthus emblica**

#### Scientific name: Phyllanthus emblica L.

It is popularly known as Amla among the Indian masses while, in most parts of the world it is known as Indian gooseberry. Widely distributed in most tropical and subtropical countries. It grows in tropical and subtropical parts of China, India, Indonesia and on the Malay Peninsula and indigenous to tropical India and Southeast Asia [16].

It has been reported that fruits contain higher amount of Vitamin C and considerably higher concentrations of most minerals, protein and amino acids like Glutamic acid, proline, aspartic acid, alanine, cystine and lysine. Hyperglycemia increases protein glycation resulting in the generation of free radicals through autoxidation of glucose and glycated proteins. These free radicals can damage proteins, lipids and nucleic acids and contribute towards oxidative stress in diabetes mellitus. *Phyllanthus emblica* effectively reduces these oxidative stresses resulting in decreased blood glucose level [17-21].

**Description:** The plant belongs to the family Phyllanthaceae; a deciduous tree, upto 15 m high, grey-brown, rough, flaky bark; leaves simple, alternate, bifarious on short deciduous branchlets, closely overlapping, subsessile; stipules minute, lateral, linear; lamina 0.4-1.5 × 2-4 mm, oblong or linear-oblong, base round, apex obtuse and shortly apiculate, glabrous, membranous; nerves obscure; flowers unisexual, 2-3 mm across, greenish-yellow, densely clustered in leaf axils; male flowers: tepals 6, oblanceolate, 1.5 mm, obtuse, stamens 3, anthers oblong, connate by their connectives; apiculate; disc glands 6; female flowers: tepals 6, oblanceolate, obtuse; ovary superior, 1.5 mm, 3-celled; ovules 2 in each cell; styles 3, broadly fimbriate, recurved, stigmatiferous; fruit a capsule 1.5-2.5 cm across, subglobose, dehiscing into 6 cocci, disc enlarged to give an appearance of fleshy yellowish-green, indehiscent berry (indiabiodiversity.org).

# **Discussion and Conclusion**

Plant derived compounds have a great potential in the treatment of disorders such as diabetes. A number of compounds have been extracted from plants that are widely used to treat diabetes. This is particularly helpful in the developing economies such as India as not most of its population can afford high end treatments as yet. In such scenarios medical systems like Homoeopathy, Ayurveda, etc. come to rescue since they provide affordable healthcare. A lot of research data is now available to substantiate the mode of action and working principles of plant derived compounds but, it is also important that we compile this scattered information and bring it closer to the common masses. Homoeopathy has contributed significantly to the treatment of diabetes. With its natural sources of drug materials the adverse effects also remain very limited. It is therefore important that we shift our attention more towards such natural ways of health care. Health issues such as diabetes are mainly a lifestyle disorder. Increasing modernization and shifting socioeconomic paradigms has not

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only allowed such disorders to develop but also has carved a niche for them to thrive. Though a lot still needs to be worked upon but with a few changes in our lifestyle and a shift towards holistic health care such as homoeopathy we can definitely make a change.

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